CHAPTER 4

HELICOPTER INTERNAL CARGO-HANDLING SYSTEM (HICHS)

4-1. INTRODUCTION. The helicopter internal cargo-handling system (HICHS) is designed for use in the CH-47 helicopter as a means of loading and unloading various configurations of cargo. This chapter describes the HICHS.

4-2. DESCRIPTION. The functional and physical descriptions of the HICHS are as follows:

a. Functional Description. The HICHS provides low-friction, load/unload conveyor ramps. It also includes conveyors for moving cargo within the aircraft.

b. Physical Descrition. The HICHS consists of three major sections. They are the cabin/cargo area, ramp section, and the ramp extension section (Figure 4-1).

(1) Cabin/Cargo Area. The cabin section of the HICHS consists of three outboard rail/roller assemblies on each side of the cabin. These outboard assemblies are identical but symmetrically opposite. These assemblies use twenty-six 5K tie-down fitting assemblies, eight 10K fitting assemblies, and two tie-down fitting assemblies. Four inboard guide/roller assemblies are mounted in the center of the cabin floor. They are secured with 10 centerline ring plug assemblies to the 5K rings in the floor.

(2) Ramp Section. The ramp section of the system includes a right-hand ramp guide assembly and a right-hand ramp inboard guide/roller assembly. There are also symmetrically opposite (left-hand) assemblies. A separate ramp support is provided for use during loading and unloading.

(3) Ramp Extension Section. This section uses two identical ramp extension roller assemblies and separate ramp extension support assemblies.

4-3. INSPECTIONS. Inspect the system components as follows:

a. Intervals. Inspect the HICHS before each mission or when any of the following events has or will occur:

(1) A new cargo-handling system has just been installed.

(2) A cargo system has been removed from storage and installed.

(3) A system has been idle in an out-of-service aircraft.

(4) Maintenance has recently been performed and the system has not been inspected.

(5) A system appears to function improperly.

b. Inspection Criteria. Perform a general inspection for any one of the reasons in paragraph 4-3a above. Inspect regularly to maintain the HICHS in good working condition. Make certain that all components are accounted for in either the installed or stowed locations as applicable. Check outboard rail/roller assemblies, inboard guide/roller assemblies, ramp guide rail/roller assemblies, and ramp extension roller assembly for cracks or breaks. No cracks or breaks are allowed.

4-4. CARGO HANDLING. The HICHS can be used for a variety of cargo.

a. Cargo Range. The HICHS can handle cargo that includes a mixture of pallets, personnel, or vehicles that may be combined. Restrain all cargo to ensure safe operation of the aircraft and the safety of personnel. Restrain the loads according to the procedures and guidelines in TMs 55-450-15 and 55-450-18.

b. Loads. Total load must always be within the normal weight and CG limits as specified in the operational technical orders.

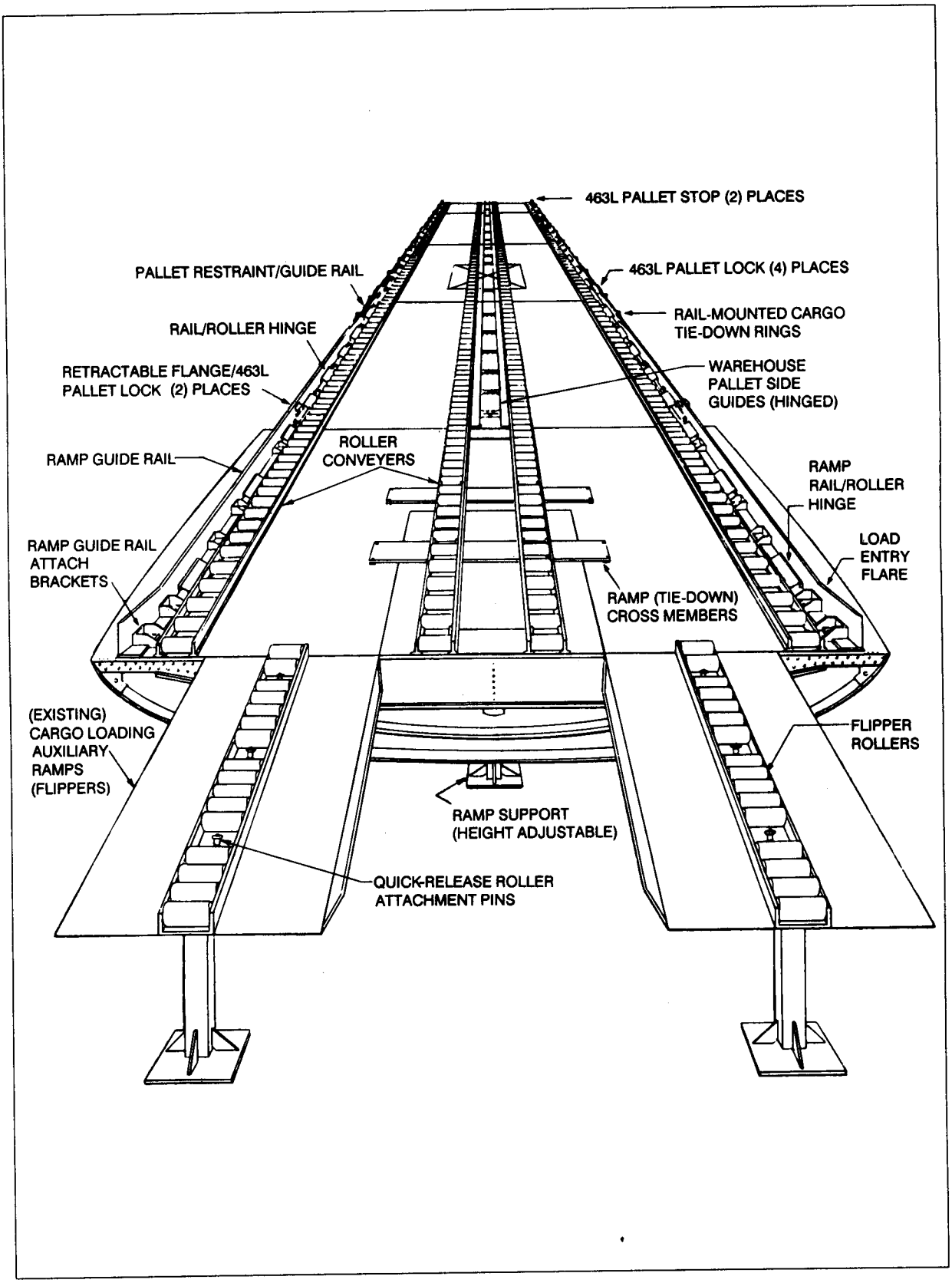

FIGURE 4-1. Helicopter Internal Cargo-Handling System (HICHS)

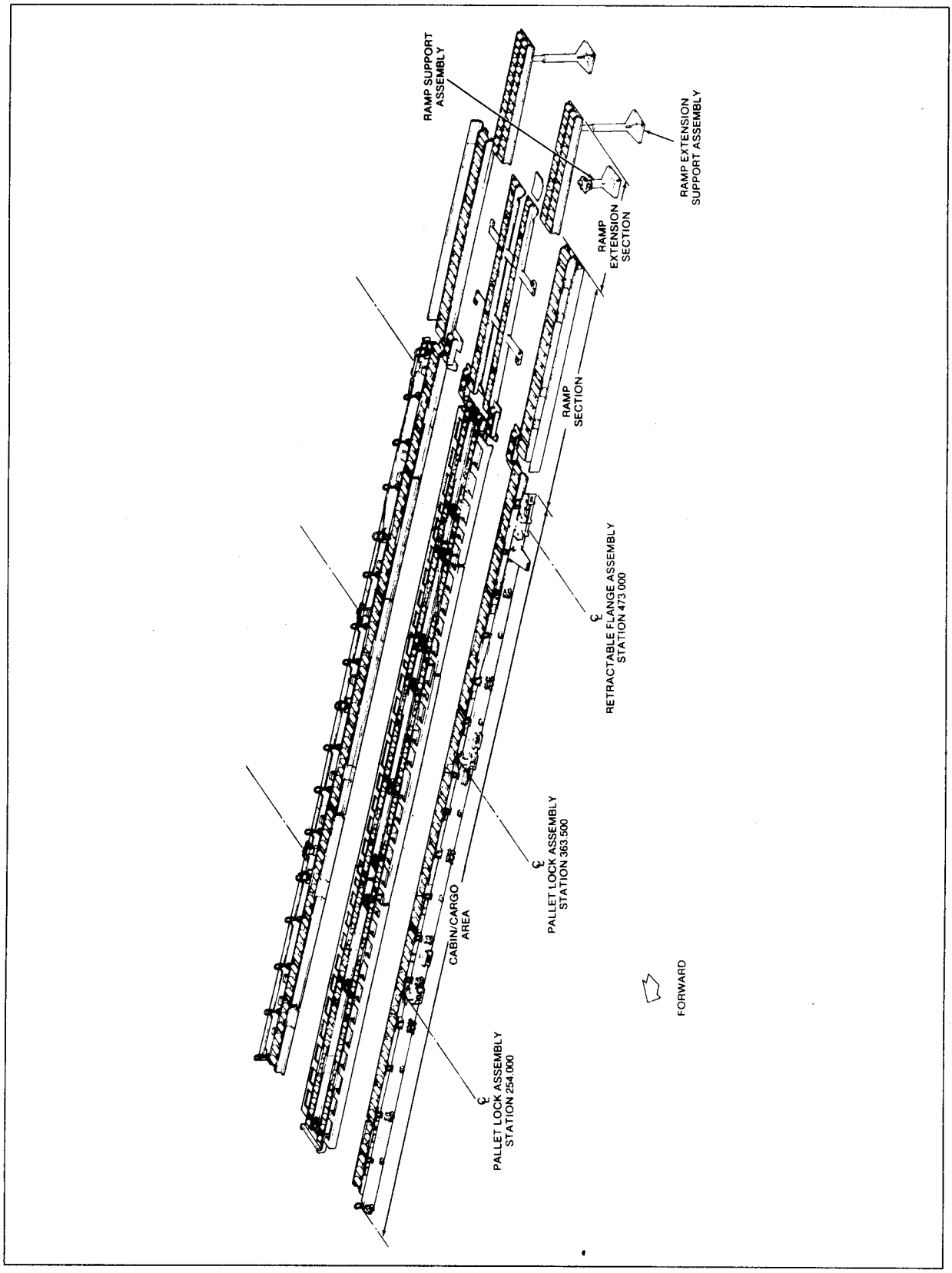

FIGURE 4-1. Helicopter Internal Cargo-Handling System (HICHS) (Continued).

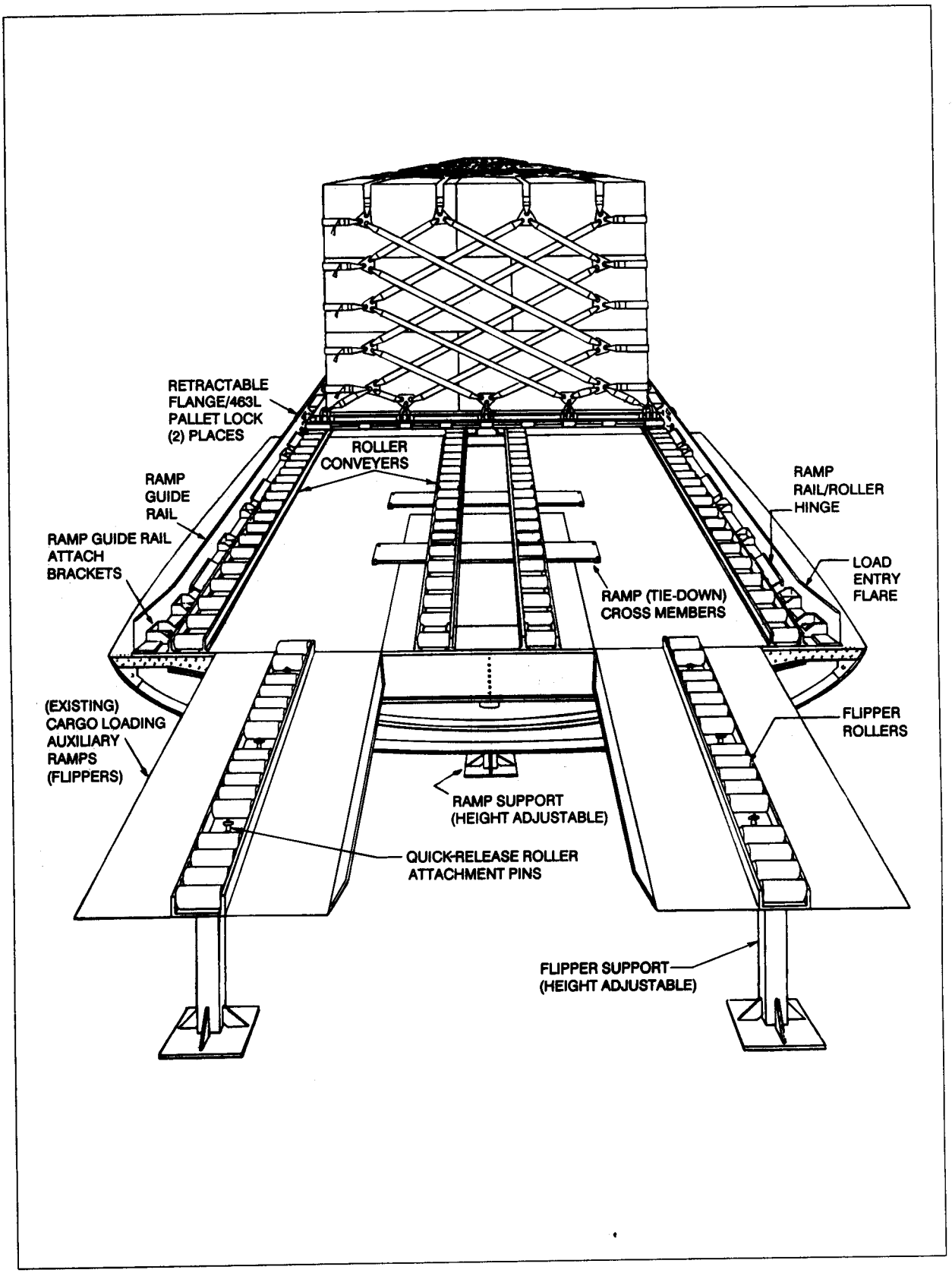

FIGURE 4-1. Helicopter Internal Cargo-Handling System (HICHS) (Continued).

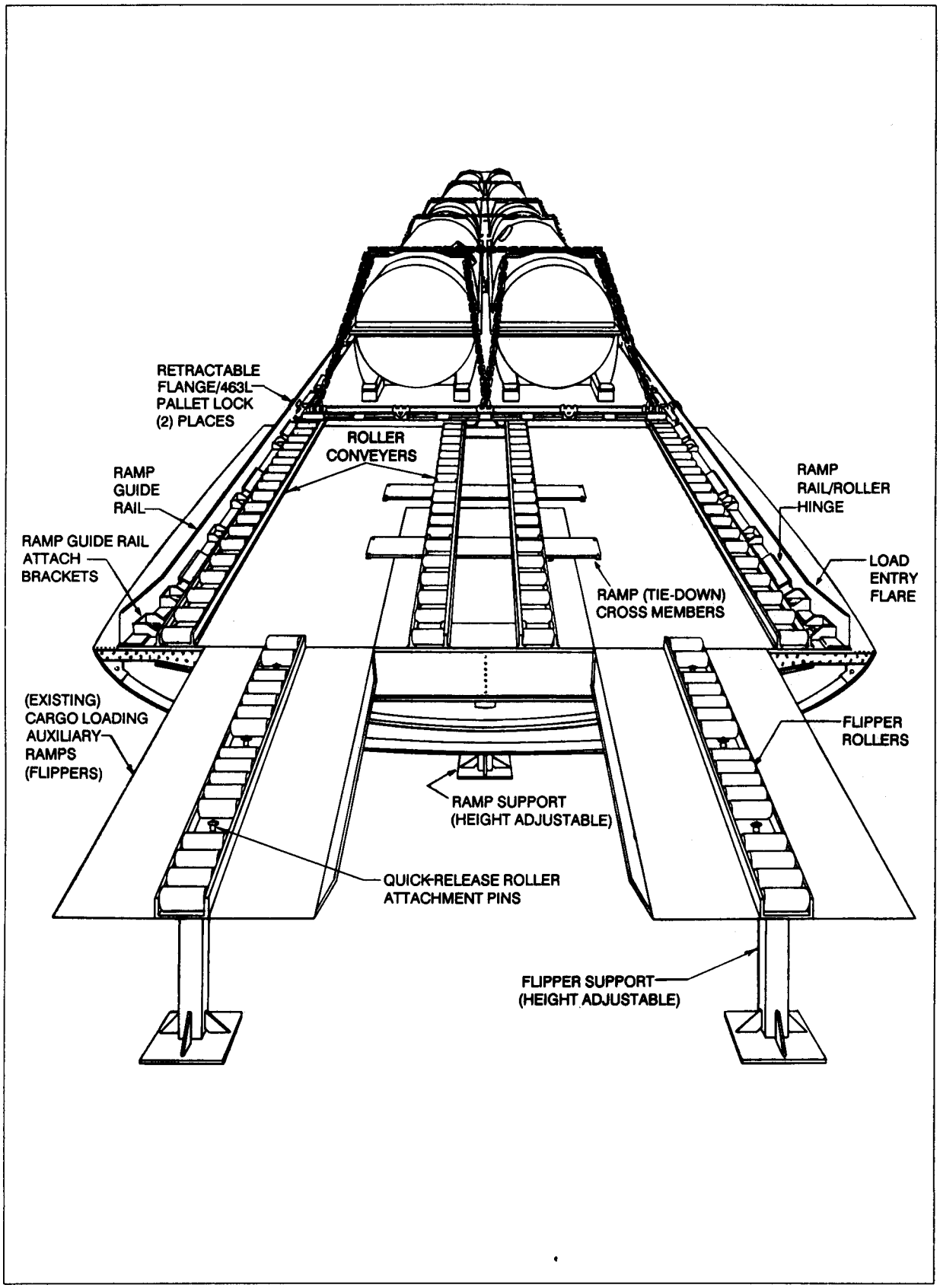

FIGURE 4-1. Helicopter Internal Cargo-Handling System (HICHS) (Continued).

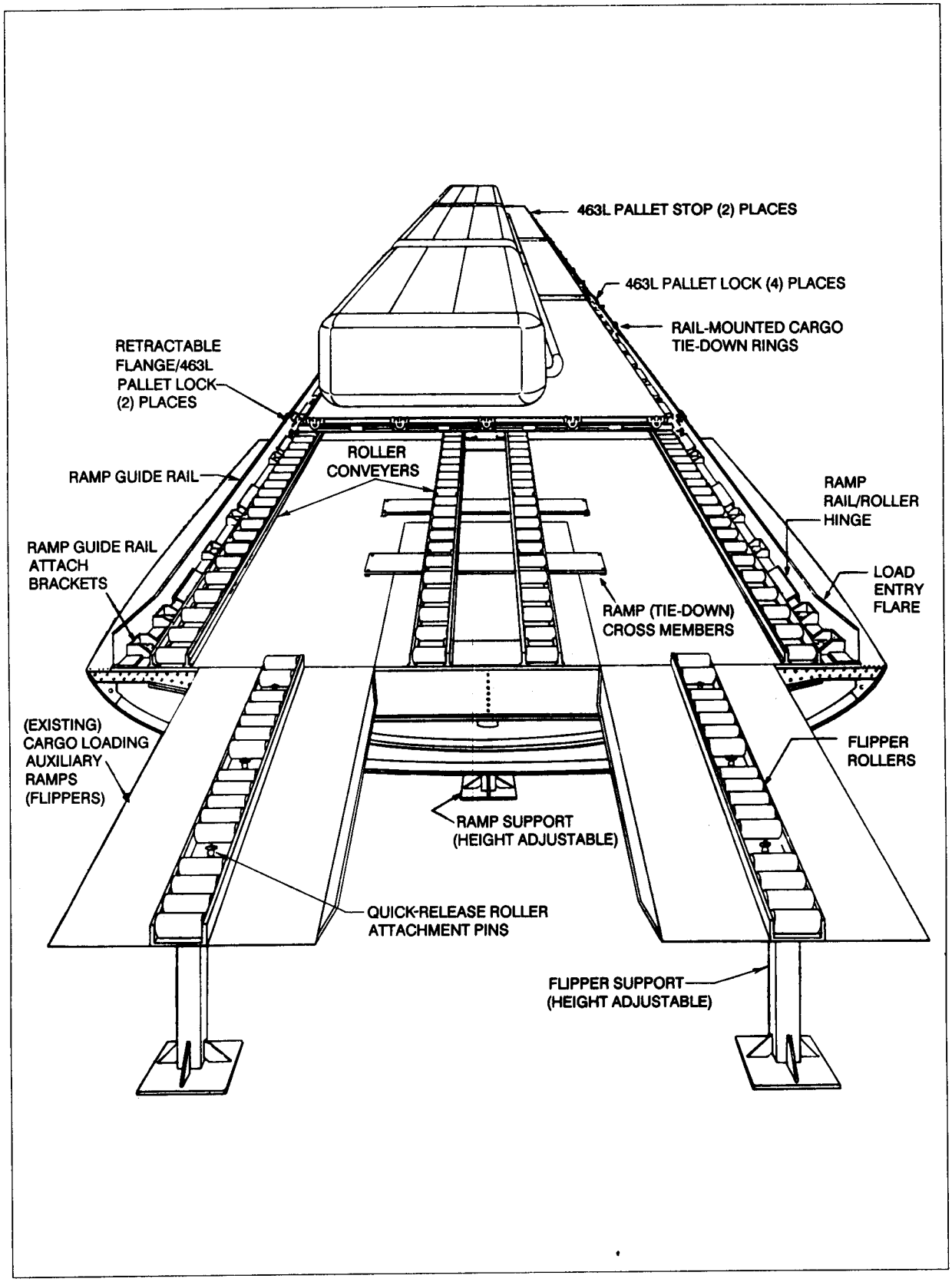

FIGURE 4-1. Helicopter Internal Cargo-Handling System (HICHS) (Continued).

4-5. LOADING. The following are loading sequences for the HICHS.

a. 463L Pallets. Up to three pallets can be winched or manually loaded on the system (maximum 7,500 pounds each).

b. Warehouse Pallets. Use the following loading sequence for warehouse pallets:

(1) Up to 8 to 12 warehouse pallets can be loaded into the aircraft. However, weight and CG requirements must be within limits. The 40-inch side should be positioned across the handling system so that the 48-inch side is on the ramp guide rail. Pallets may be winched or manually loaded.

(2) Pallet combination of 463L and warehouse pallets, as well as other combinations, with vehicular loads can be loaded into the aircraft.

c. Wheeled Vehicles. Winch or manually load the vehicles into the aircraft. For specific procedures, refer to TM 55-450-18.

d. Personnel. The HICHS is compatible for personnel only or both cargo and personnel. If both are loaded, the cargo must be forward of the personnel for safety.

e. Miscellaneous Cargo. Place on a pallet or skid as desired. If a 6/E pallet is used, secure the pallet lock assemblies or retractable flange assemblies. Straps or chains may be used as required.

f. Mixed Cargo. Any of the above cargo may be mixed as desired. The only limitation is space.

4-6. 463L CARGO SYSTEM. In 1957, the USAF adopted a standardized system to facilitate the rapid movement of general cargo aboard airlift aircraft. This 463L system encompasses all phases of cargo loading including MHE, cargo loading platforms, restraint equipment, and in-aircraft systems. The 463L system is the Air Force standard for movement of concentrated cargo. The system is extremely efficient and can reduce ground times by as much as 75 percent.

a. Construction. The 463L master pallet (Figure 4-2) is made of corrosion resistant aluminum with soft wood core and is framed on all sides by aluminum rails. The rails have 22 steel tie-down rings attached in such a manner that there are six rings on each long side and five rings on each short side. The rails also have indents (notches) designed to accept the detinet locks located on numerous types of MHE and are found on board all airlift-capable aircraft. The overall dimensions of the 463L pallet are 108 inches wide by 88 inches long and 2 ¼ inches thick. However, the usable dimensions of the upper surface are 104 inches wide by 84 inches long. This allows for 2 inches around the periphery of the pallet to attach straps, nets, or other restraint devices. An empty 463L pallet weighs 290 pounds (355 pounds with nets) and has a maximum load capacity of 10,000 pounds. The maximum pounds per square inch (psi) for the 463L pallet is 250 pounds. Concentrated loading should not exceed 330 pounds on any one square foot. If a load exceeds this amount, then shoring must be used. Each of the 22 tie-down rings has a 7,500-pound restraint capacity.

b. Pallet Nets. There are three nets to a set: two side nets and one top net (Figure 4-3). The side nets are green in color and the top net is yellow. The side nets attach to the rings of the 463L pallet and the top net attaches by hooks to the side nets. These nets have a multitude of adjustment points and may be tightened to conform snugly to most any load. A complete set of 463L nets will provide adequate restraint for 10,000 pounds of cargo when properly attached to a 463L pallet. A complete set of 463L nets (three) weighs 65 pounds.

4-7. OPERATIONAL HANDLING AND STORAGE OF 463L PALLETS. The 463L pallets and nets are extremely expensive to purchase and refurbish. With reasonable care and protection, they should last almost indefinitely. The procedures to care for these pallets and nets are simple. Always follow these guidelines:

a. Always put adequate dunnage under 463L pallets by installing a minimum of three 4-inch by 4-inch pieces at least as long as the pallet. This will aid in the movement of the pallets and will protect the lower surface from damage. (Dunnage must accompany the pallets during shipment.)

b. Pallets may be stored in stacks of 40 high. Double stacks (two 20-pallet sets stacked vertically) are authorized for unit/APOE/APOD storage areas, provided they are properly supported. Never stack them upside down for this could damage the rings or the aluminum skinned surface. Only a single stack, properly restrained by 463L nets, may be transported by air. Three pieces of dunnage must be placed between an additional base pallet and the first pallet

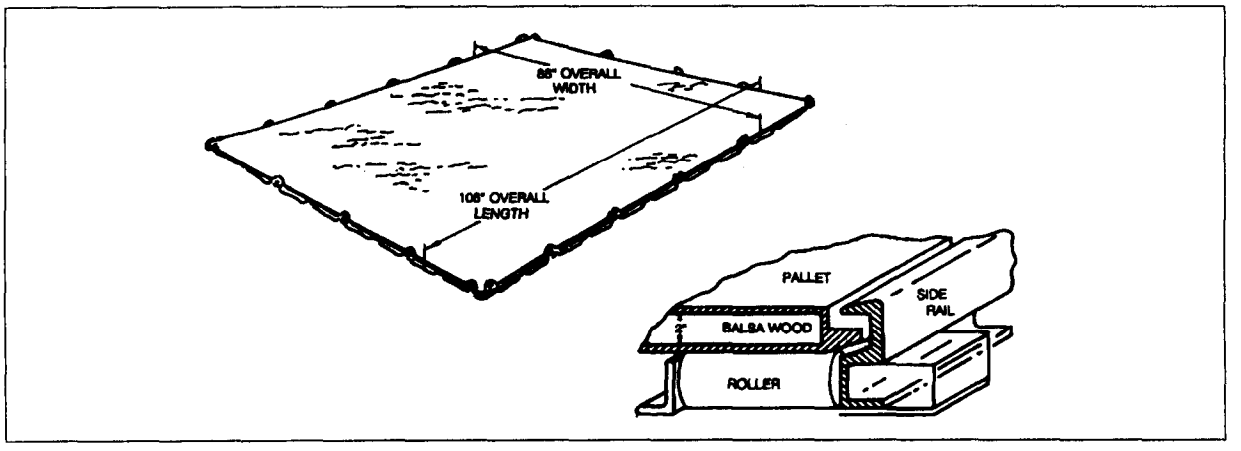

FIGURE 4-2. 463L Master Pallet.

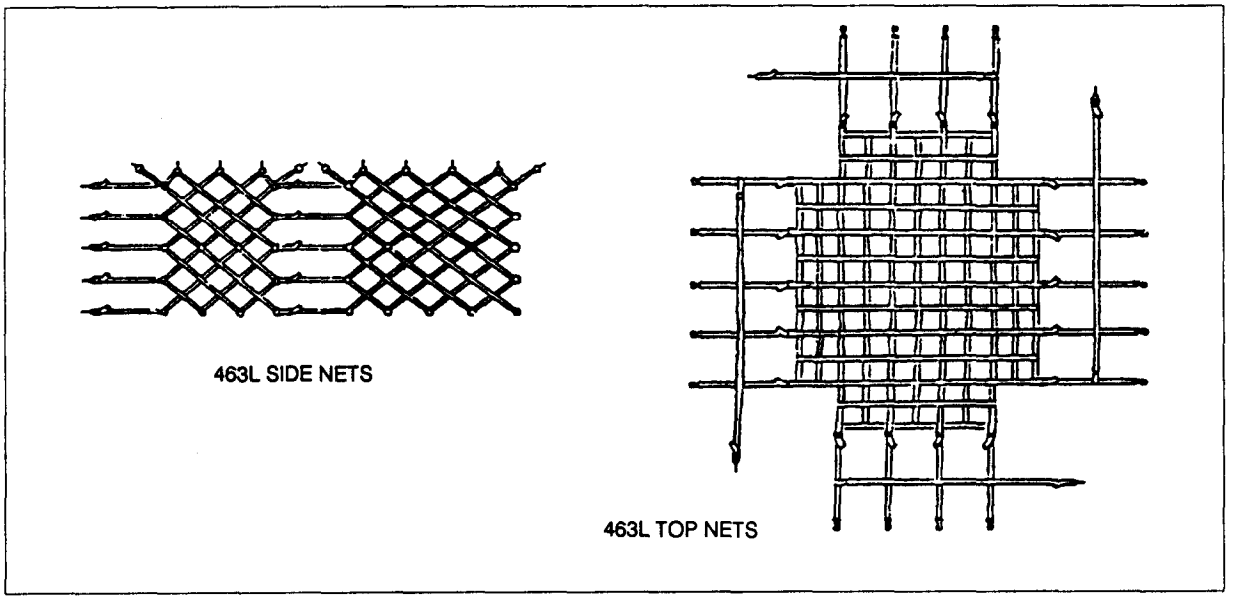

FIGURE 4-3. Pallet Nets.

of the stack provided clearance with the aircraft rail system.

c. Always protect the upper surface of the pallet from sharp-edged cargo. If the cargo you wish to load has any sharp edges or protrusions, install adequate shoring or cushioning materials between the cargo and the pallet to prevent damage.

d. Exercise care when transporting 463L pallets with the forklift tines (forks). The tine tips can easily damage the pallet surface rendering it unusable. The proper and preferred method of handling loaded 463L pallets is with a forklift that has tines measuring at least 72 inches long. Tines 8 inches wide are preferred. Use them whenever possible. Using forklifts with shorter tines, picking up the pallet suspended from the corners with a crane, or other similar methods are not authorized for routine pallet movement. Any deviations shall be authorized by WR-ALC/MMVR.

CAUTION

Forklift operators must ensure cargo load is properly secured to the pallet (using nets, straps, or chains) before moving the pallet.

e. Whenever winching a 463L pallet, always use two attaching points.

f. Never push or slide 463L pallets across any solid surface; to do so will cause damage to the skin.

g. Protect nets from adverse climatic conditions. The netting material will mildew and deteriorate. The metal hooks will also rust if not properly cared for. Hang and dry all nets after use. Never pile wet nets together for storage.

h. Place a plastic barrier between dunnage and the bottom pallet to prevent moisture from penetrating through dunnage to bottom surface of pallets.

i. Because 463L pallets weigh in excess of 270 pounds, movement by hand is unauthorized.

4-8. INSPECTION OF 463L PALLETS

a. Inspect pallets and nets to assure serviceability. Do not use pallets if the aluminum skin is separating. The skin-to-rail bond is an important portion of the pallet's strength. Use pallets with minor dents, gouges, and scratches that do not fracture the skin. For more extensive damage (such as bent rails or damaged/missing tie-down rings), the pallet will not be accepted for shipment and must be sent to depot for repairs. Keep pallets as clean as possible to protect the cargo and prevent the spread of insects, dirt born infestations, and so forth.

b. The following procedures apply for storing pallets that have been designated as war readiness material (WRM):

(1) Inspect WRM pallets annually. Stagger the inspections, that is, one-half every 6-month period.

(2) Inspect a minimum of 10 percent of each 40-pallet group and include one pallet from each series of 10 pallets.

(3) The installation pallet manager will maintain an inspection record and will furnish one copy to the MACOM pallet manager.

4-9. PALLET BUILDUP. Palletize cargo from the heaviest to the lightest. Distribute large and heavy objects evenly from the center of the pallet outwards to prevent the pallet from becoming heavy on one end (Figure 4-4). This also helps to maintain the CB at or near the center (Figure 4-5). Place lighter and/or smaller items on top or along the side of the heavier cargo. Containers marked THIS SIDE UP must be placed upright and cargo with special labels facing outward whenever possible. Construct the load in a square or pyramid shape whenever possible (Figure 4-6). This makes the load stable, easy to handle, and easier to secure on the pallet. As you build the pallet load, use a pallet template or measuring stick so as not to exceed aircraft height limitations.

NOTE: Each aircraft has restrictions as to the dimensional size and shape particular to that specific aircraft. Check the particular requirements of the aircraft for which the load is prepared.

4-10. MARRIED PALLETS

a. In the movement of cargo, you often encounter odd shapes and sizes of cargo that require movement by air. As previously described, the 463L pallet is 108 inches wide by 88 inches long with a maximum cargo weigh capacity of 10,000 pounds. When there is a requirement to ship a piece or pieces of cargo that exceed these dimensions, join two or more pallets together (Figure 4-7). This is referred to as the marrying of pallets (also referred to as double or two pallet trains).

b. Before marrying pallets, inspect them to ensure that they are clean and in good repair. Ensure that

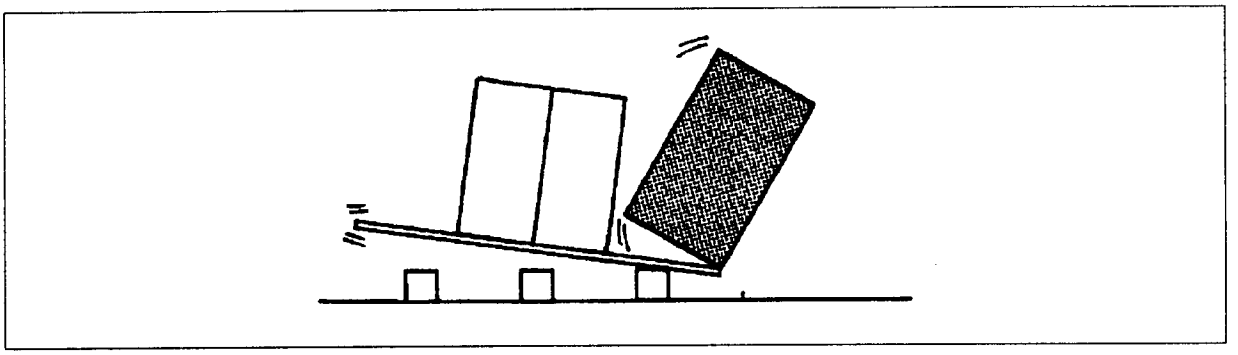

FIGURE 4-4. Heavy Ended Pallet.

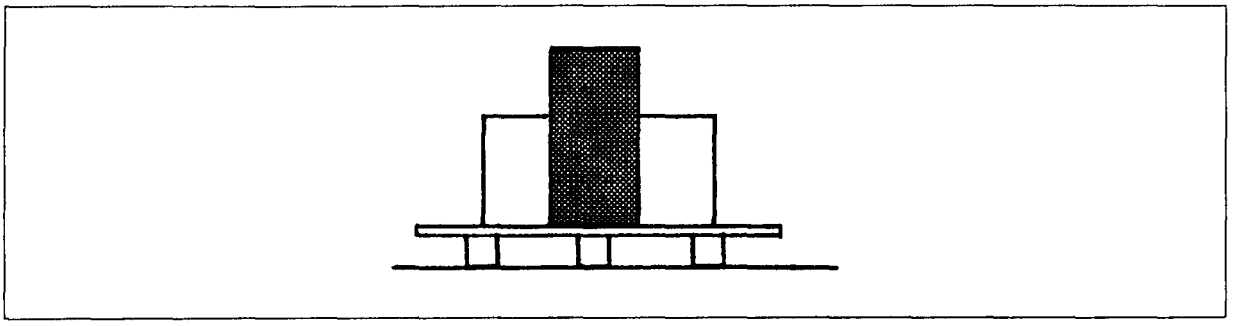

FIGURE 4-5. 463L Pallet Cargo Placement.

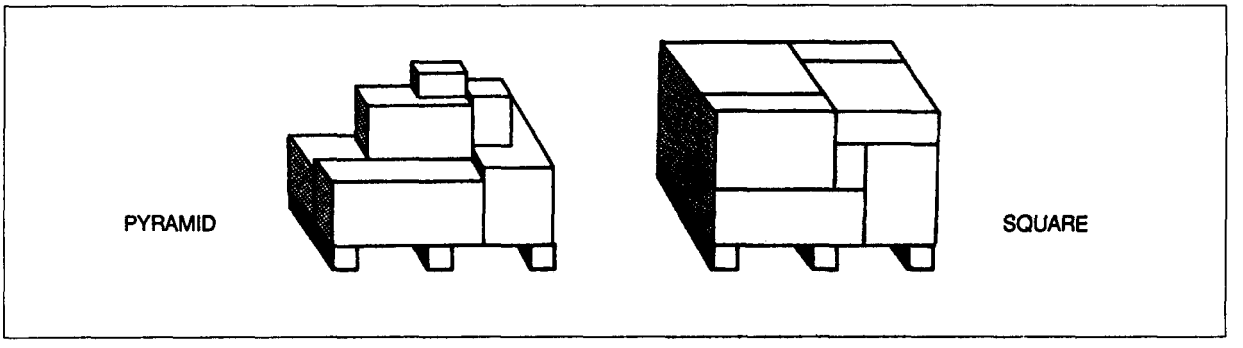

FIGURE 4-6. 463L Pallet Cargo Placement (Pyramid and Square).

the rails are not bowed and the tie-down rings are securely mounted. After checking the pallets, place them on a cargo dock, rollerized flatbed trailer, or k-loader. Align the indents along the 108-inch dimension of each pallet. Install prefabricated spacers between the pallets. The spacers are used to keep the pallets aligned and properly spaced so that they will lock into the aircraft's rail systems.

4-11. CARGO PLACEMENT ON MARRIED PALLETS. Load long, heavy cargo on the pallet first. Distribute heavy cargo evenly on the pallet to prevent the pallet from becoming heavy ended. Then place light cargo on top of and/or around the heavier cargo. Ensure labels face outward whenever possible. As you secure the cargo on the pallet, make sure that you do not exceed the dimension and weight limitations for the designated aircraft. Include appropriate documentation on the load manifest and ensure that you indicate that the pallets are married (Figure 4-8).

4-12. TIE-DOWN TECHNIQUES. There are many techniques for tying down and lashing cargo. Some key points to remember are —

a. Use a barrier and chain gate (Figure 4-9) for loose, heavy items such as lumber and pipes.

b. Use chains and tie-down devices for large items such as canned engines or palletized wheeled items.

c. Do no attach more than 50 percent of the restraint to the axles of wheeled vehicles.

d. Use 463L net for multiple loose items that tit within the usable dimensions of a single 463L pallet.

e. Use chains for heavy items such as large boxes and vehicles (Figure 4-9).

f. Finally, use 5,000-pound tie-down straps, as required, to provide individual item restraint (Figure 4-10) or to provide supplemental restraint (Figure 4-11) to the 463L nets.

4-13. CARGO NET INSTALLATION. Before using the nets, lay out all the nets and inspect them for serviceability. Do not use any nets that are torn or rotted, or have bad/missing hooks. Only one bad strap/hook in all of those on the net is enough to make the entire net unserviceable.

a. Side Nets

(1) Make sure that you have identified the long side (6 hooks) and the short side (5 hooks) of the net,

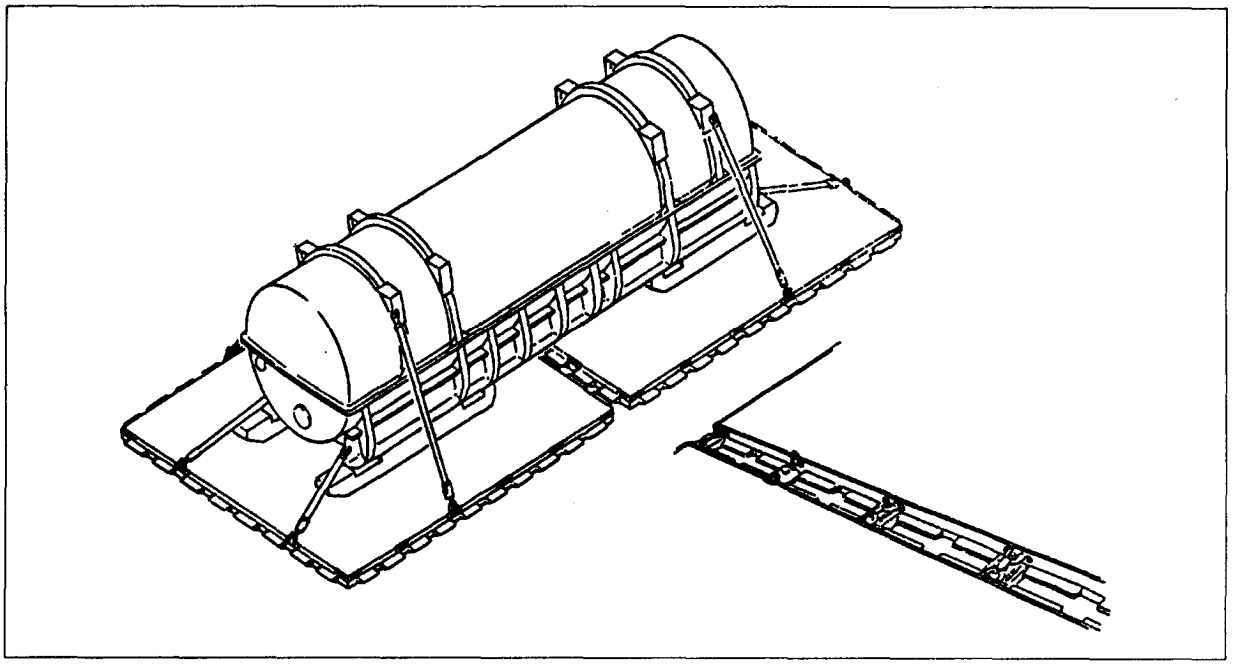

FIGURE 4-7. Married 463L Pallet Assignment.

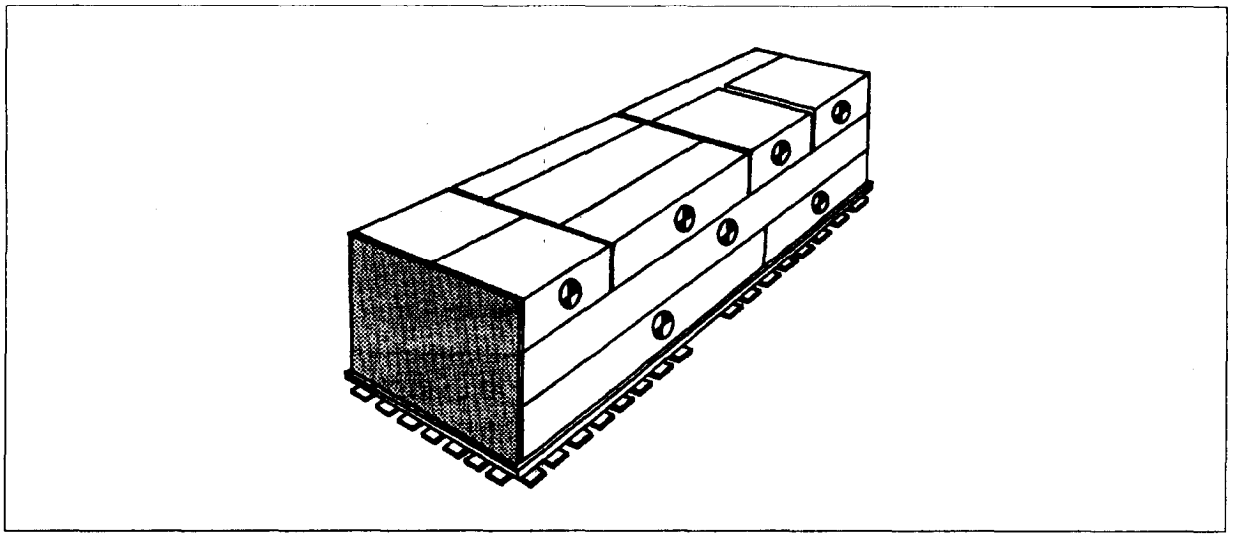

FIGURE 4-8. Cargo Placement.

and that the net is right-side up. The net must be right-side up so the bottom hooks will be pointing inward after the nets have been attached to the pallet. If the net is right-side up, the hooks will be facing down as the net is laying on the ground. In addition, many of the nets are marked OUTSIDE.

(2) Place the two side nets around the cargo on the pallet, and hook the hooks into the pallet rings. Recommend starting at one corner and working your way around the pallet. Make sure the straps/hooks of the net cross at the corners of the pallet. Pull the net as high as it will go and hook the two side nets together. Each side net has adjustable straps between the long and short side to make necessary adjustments depending on placement of the cargo. If you have correctly hooked the side nets to the pallet rings, you will have O-rings and tension adjustable hooks to join together, uniting the two side nets. Do not tighten these straps until the side nets are hooked to the top net.

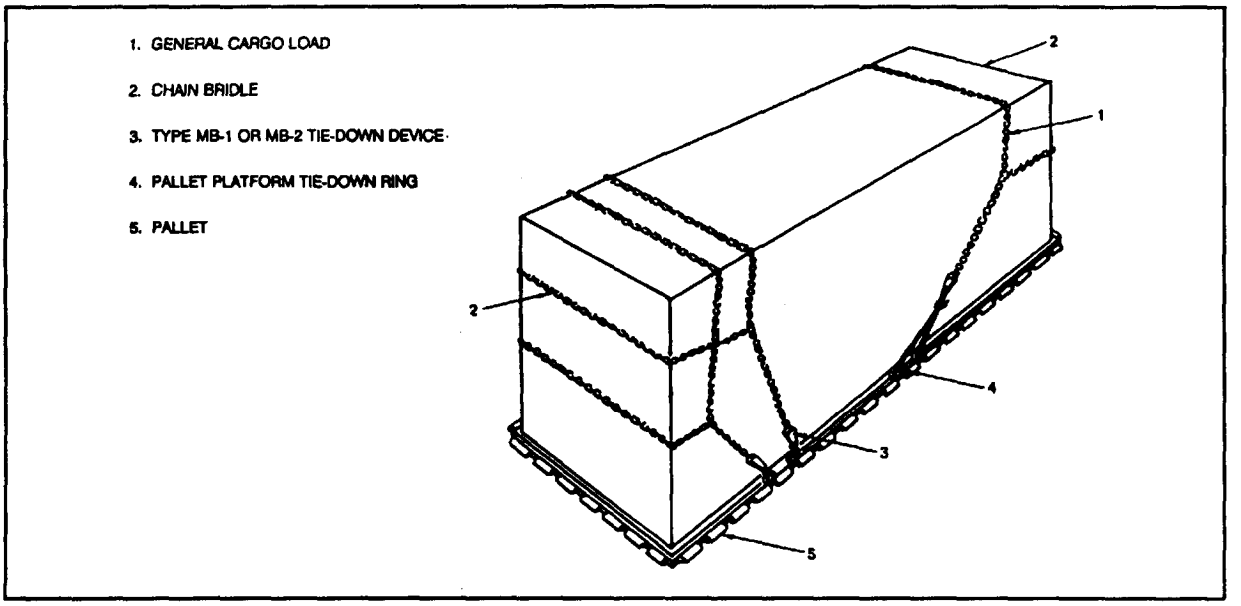

FIGURE 4-9. Barrier and Chain Gate.

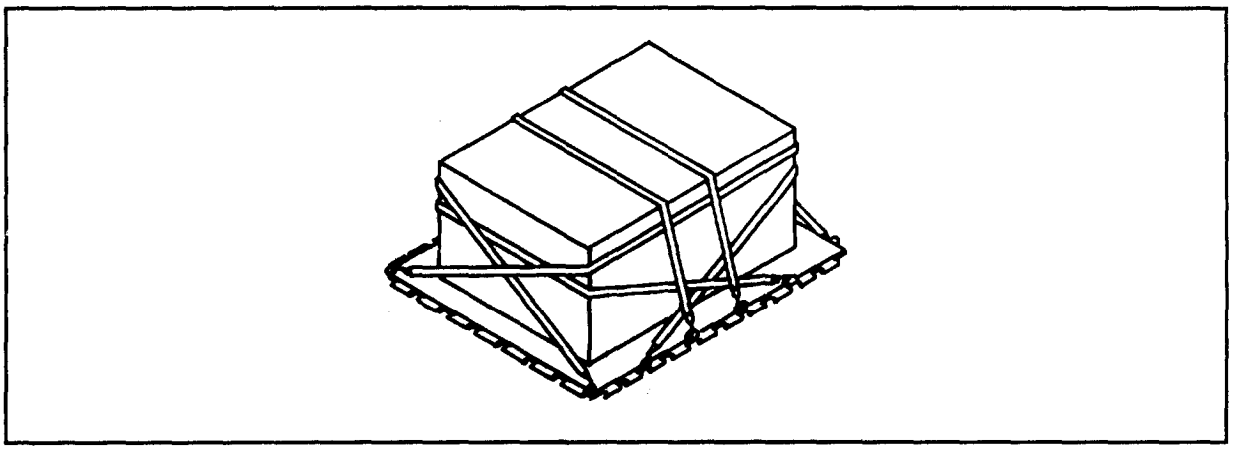

FIGURE 4-10. Cargo Restraint for All Load Direction.

b. Top Net. Place the top net over the cargo making sure that it is centered. The long side of the top net goes with the long side of the side net. Hook the top net into the side nets by using the O-rings. Always use the same row of rings on the side nets to ensure that the top net pulls evenly. When the top net is hooked in, pull evenly on all straps to tighten the top net. Two people should do this to ensure that the net stays even. When all the straps are tightened, including the side net straps, tuck the loose ends of the straps into the netting to prevent snagging on something in the aircraft (Figure 4-12). The most prevalent reason cargo is refused or delayed from loading on an aircraft is poor pallet buildup or netting. If the possibility of inclement weather exists at either departure or arrival airfield, cover the palletized cargo with plastic pallet covering. Now the pallet is ready for weighing.

4-14. DETERMINATION OF PALLET WEIGHT. Each 463L pallet built must be weighed and the scaled weight must be recorded on all copies of the manifest. Additionally, assure that the scaled weight is clearly marked on each side (88 inch) of the 463L pallet. Pallet weight markings may be stapled to the net. At weighing time, also measure for cargo height. Pass this information along with the pallet weight for recording on the cargo manifests.

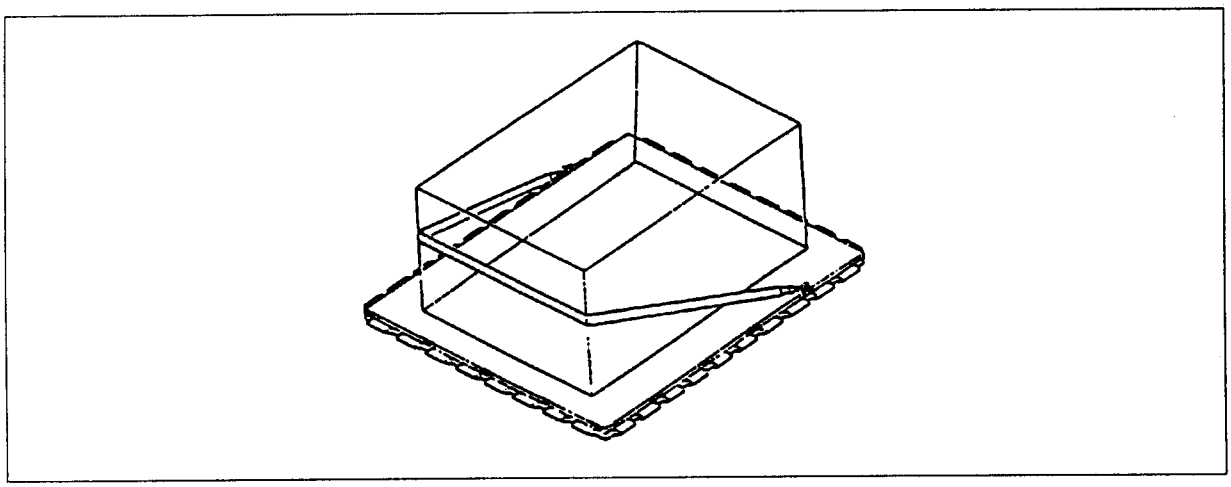

FIGURE 4-11. Supplemental Restraint.

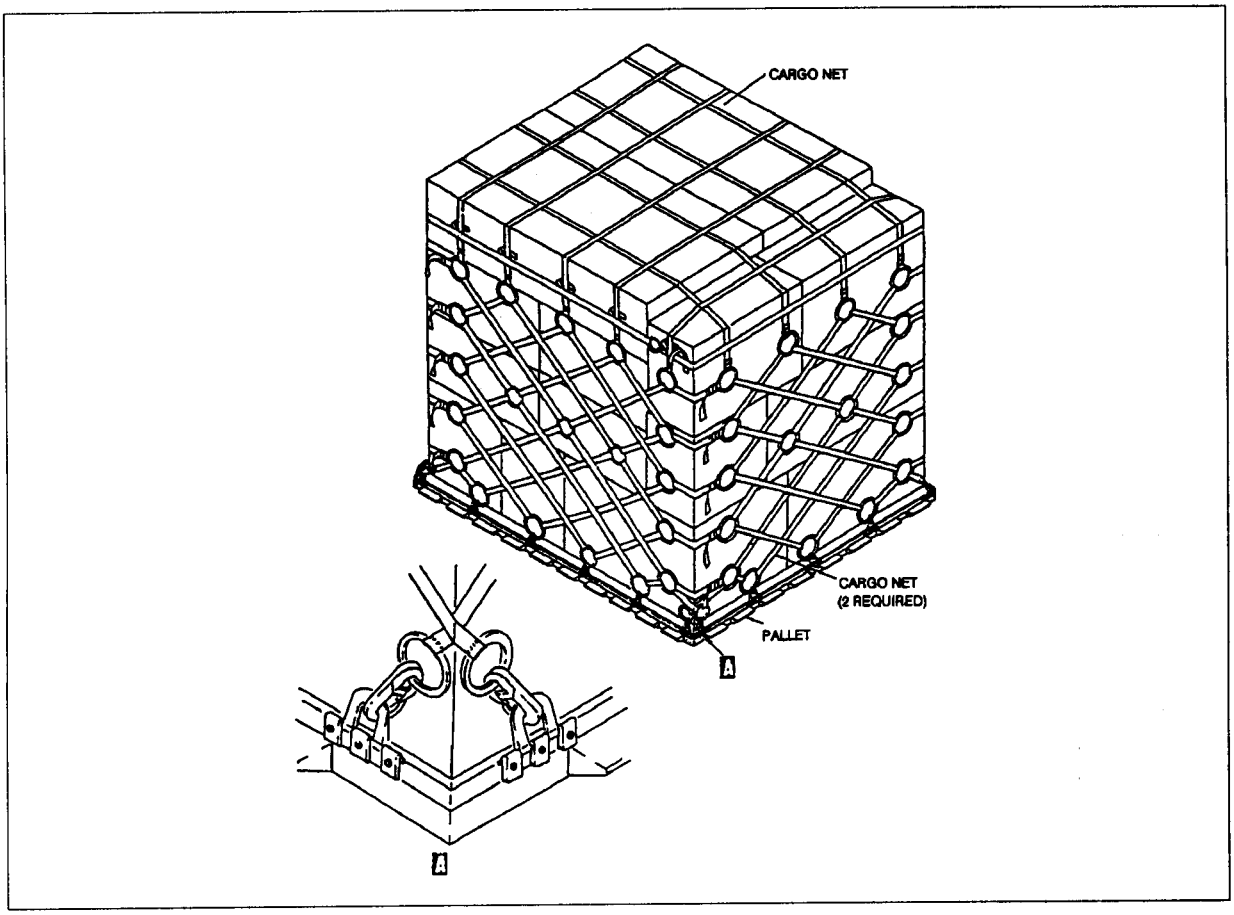

FIGURE 4-12. Typical Net Attachment.